

Observations of Phenomena of Jupiter's Satellites with the 8-inch  
Equatorial at Windsor, New South Wales, in the year 1895.  
By John Tebbutt.

Day of Obs.	Satellite.	Pheno- menon.	Phase.	Mag. Power.	G.M.T. of Observation.			Mean Time of <i>N. Almanac.</i>		
					h	m	s	h	m	s
Feb. 4	III.	Ecl. R.	First seen	74	23	50	20	23	52	42
4	III.	"	Full brightness	"	23	57	8			
8	I.	"	First seen	"	0	13	44	0	14	17
8	I.	"	Full brightness	"	0	17	40			
11	III.	Occ. R.	First seen	132	23	23	15			
11	III.	"	Bisection	"	23	24	25	23	30	
11	III.	"	Last contact	"	23	26	6			
12	III.	Ecl. D.	Began to fade	74	0	57	27			
12	III.	"	Last seen	"	1	5	35	1	3	59
14	I.	Occ. D.	First contact	168	22	44	14			
14	I.	"	Bisection	"	22	46	44	22	48	
14	I.	"	Last seen	"	22	48	39			
15	II.	Ecl. R.	First seen	74	21	44	8	21	45	25
15	II.	"	Full brightness	"	21	46	51			
15	I.	Tr. Egr.	Int. contact	"	22	15	41			
15	I.	"	Bisection	"	22	17	36	22	20	
15	I.	"	Ext. contact	"	22	20	35			
22	I.	Tr. Ingr.	Ext. contact	200	21	54	41			
22	I.	"	Bisection	"	21	56	58	21	54	
23	I.	Ecl. R.	First seen	74	22	34	1	22	34	28
23	I.	"	Full brightness	"	22	37	26			
Mar. 1	III.	Tr. Egr.	Bisection	"	20	58	38	21	0	
1	III.	"	Ext. contact	"	21	5	22			
1	II.	Occ. D.	First contact	132	21	46	2			
1	II.	"	Bisection	"	21	48	30	21	50	
1	II.	"	Last seen	"	21	51	54			
1	I.	Tr. Ingr.	Ext. contact	"	23	48	33			
1	I.	"	Bisection	"	23	49	30	23	46	
1	I.	"	Int. contact	"	23	50	50			
3	I.	Tr. Egr.	Ext. contact	"	20	27	42			
3	I.	"	Bisection	"	20	29	12	20	30	
3	I.	"	Ext. contact	"	20	32	7			
7	IV.	Occ. R.	Last contact	74	21	8	19	20	33	
11	I.	Ecl. R.	First seen	"	20	54	21	20	54	57

Day of Obs.	Satellite.	Pheno- menon.	Phase.	Mag. Power.	G.M.T. of Observation.			Mean Time of <i>N. Almanac.</i>		
					h	m	s	h	m	s
Mar. 18	I.	Ecl. R.	First seen	74	22	50	12	22	50	42
18	I.	"	Full brightness	"	22	53	50			
25	I.	Occ. D.	First contact	168	21	10	2			
25	I.	"	Bisection	"	21	12	26	21	13	
25	I.	"	Last seen	"	21	13	36			
Apr. 3	I.	Ecl. R.	First seen	74	21	10	36	21	11	0
3	I.	"	Full brightness	"	21	14	26			
9	I.	Tr. Ingr.	Ext. contact	"	22	17	28			
9	I.	"	Bisection	"	22	20	47	22	20	
9	I.	"	Int. contact	"	22	23	37			
10	IV.	Ecl. R.	First seen	138	21	39	19	21	52	36
10	IV.	"	Full brightness	"	21	55	22			
20	II.	Ecl. R.	First seen	"	21	3	34	21	4	45
20	II.	"	Full brightness	"	21	7	6			
24	III.	"	First seen	"	20	6	49	20	8	30
24	III.	"	Full brightness	"	20	14	36			
26	I.	"	First seen	"	21	26	27	21	26	41
May 12	I.	"	First seen	74	19	45	55	19	46	13
12	I.	"	Full brightness	"	19	49	20			

*Remarks.*

Feb. 4.—Clear sky, but moon present.

Feb. 8.—Sky beautifully clear and images steady and well defined.

Feb. 11.—Sky clear and definition pretty good; the first phase observed rather late.

Feb. 12.—Steadiness and definition very satisfactory. First phase noted late; the satellite had certainly faded as compared with the other satellites. I thought I could again see the satellite for moment, eight seconds after the recorded time of disappearance.

Feb. 14.—Images rather tremulous, particularly at final disappearance.

Feb. 15.—II. suspected at recorded time; I was certain of it three seconds later. The planet had just emerged from a thin cloud. Definition of I. pretty good.

Feb. 22.—Good definition at external contact, but not so at bisection.

Feb. 23.—Sky beautifully clear with good definition; moon absent.

Mar. 1.—Planet badly defined and boiling. Bisection of III. very unsatisfactory; definition better at external contact. Images steady and fairly defined at ingress of I., but external contact noted rather late in consequence of cloud.

Mar. 3.—Images steady and well defined. The shadows of I. and II. were at the same time on the disc. The shadow of I., the further one from the centre of the disc, was projected on a bright zone, and appeared as a dark, hazy spot, while the shadow of II. was seen as a perfectly black spot on one of the dark belts of the planet.

Mar. 11.—Steadiness and definition satisfactory.

Mar. 18.—Clear sky, but images somewhat tremulous.

Mar. 25.—Fair definition.

Apr. 3.—Sky clear and definition good, but images slightly tremulous.

Apr. 9.—Planet low and boiling, and observations unsatisfactory.

Apr. 10.—Sky beautifully clear, and planet low; the images, however, were pretty steady and well defined. This was the first eclipse visible here of the new cycle. The observer's position was taken at the telescope about 16 min. before the time of the *Nautical Almanac*, and the satellite was first seen as a very small brownish speck.

Apr. 20.—Definition fairly good, but images slightly tremulous. Observation of first appearance possibly a second late.

Apr. 24.—Sky beautifully clear. On the whole the planet was pretty well defined, but the limb occasionally boiled.

Apr. 26.—Sky beautifully clear, but planet low and boiling.

May 12.—Sky beautifully clear, but twilight pretty strong; planet's limb occasionally boiled.

*Note.*—An occulting bar was not employed in the eclipse observations. The times given in the first and sixth columns are the Windsor mean times of observation diminished by  $10^h 3^m 20^s.5$  and entered to the nearest second. The observations of full brightness in the eclipses are at the best only roughly approximate. In determining these times the increasing light of the satellite was repeatedly compared with the other visible satellites.

*Private Observatory, Windsor, N.S. Wales:*

1895 June 22.

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*Results of Micrometer Comparisons of Saturn and  $\kappa$  Virginis,*  
1895 May. By John Tebbutt.

During the close approach of *Saturn* to  $\kappa$  *Virginis* in May last I availed myself of the opportunity for securing a careful series of filar micrometer comparisons of the planet with the 8-inch equatorial. Comparisons were made on six nights under the most satisfactory conditions, the images being steady and well defined. A magnifying power of 74 diameters was employed throughout. On each of the first five evenings ten comparisons of the planets *preceding* and *north*, and the same number of the *following* and *south* limbs were made, in order to eliminate as much as possible any effect due to an error of the tabular semidiameter of the planet. On the last evening five comparisons only were obtained of each pair of corresponding limbs. The differential measures have been corrected for the tabular semidiameter, refraction, and a small inclination of the transit thread to the meridian when the distance threads were set parallel to the equator. The star's mean place for 1895.0 has been adopted as R.A. =  $14^h 7^m 17^s.59$ , N.P.D. =  $99^\circ 47' 5''.8$  from the Greenwich Five-Year Catalogue of 258 Fundamental Stars for 1890. Considering the excellent conditions for observing, and the almost absolute accuracy of the place of the comparison star, I venture to think that the results as given in the accompanying table will prove as satisfactory as any derived from observations on the meridian. The last column of the table exhibits the resulting errors of the ephemeris on page 260 of the *Nautical Almanac*. The reductions plainly indicate that the semidiameter of the *Nautical Almanac* is somewhat too small. Measures of *Venus* and  $\epsilon$  *Geminorum* were obtained on May 19 and 20, but the objects were so badly defined and tremulous that the results are scarcely worth publication.